Study plan

Name of study plan: Medical electronics and bioinformatics

Faculty/Institute/Others: Faculty of Electrical Engineering

Department:

Branch of study guaranteed by the department: Welcome page

Garantor of the study branch:

Program of study: Medical Electronics and Bioinformatics

Type of study: Follow-up master full-time

Required credits: 114
Elective courses credits: 6
Sum of credits in the plan: 120

Note on the plan: Specializace Zpracování signál

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 60

The role of the block: P

Code of the group: 2018_MBIODIP Name of the group: Diploma Thesis

Requirement credits in the group: In this group you have to gain 30 credits Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 30 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BDIP30	Diploma Thesis	Z	30	22s	L	Р

Characteristics of the courses of this group of Study Plan: Code=2018_MBIODIP Name=Diploma Thesis

BDIP30	Diploma Thesis	Z	30		
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of student will choose a topic from a range of topics related to his or her branch of the student will be a stud					
he enseified by brench	department or branch departments. The diplome thesis will be defended in front of the board of examinars for the comprehen	onive final everning	otion		

Code of the group: 2018_MBIOP

Name of the group: Compulsory subjects of the programme

Requirement credits in the group: In this group you have to gain 30 credits

Requirement courses in the group: In this group you have to complete 5 courses

Credits in the group: 30

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BAM31BSG	Biological signals Roman mejla Roman mejla (Gar.)	Z,ZK	6	2P+2L	L	Р
BMPROJ6	Diploma Project Roman mejla, Jan Kybic, Vratislav Fabián, Petr Pošík Petr Pošík Roman mejla (Gar.)	Z	6	0p+6s	Z,L	Р
BAM31LET	Medical Instrumentation and Devices Jan Havlík Jan Havlík (Gar.)	Z,ZK	6	2P+2L	Z	Р
B4M36SAN	Statistical Data Analysis Ji í Kléma Ji í Kléma Ji í Kléma (Gar.)	Z,ZK	6	2P+2C	Z	Р
BAM33ZSL	Medical Imaging Systems Jan Kybic, Vít Herynek, André Sopczak Jan Kybic Jan Kybic (Gar.)	Z,ZK	6	2P+2C	L	Р

Characteristics of the courses of this group of Study Plan: Code=2018 MBIOP Name=Compulsory subjects of the programme

			 <u> </u>		 		
BAM31BSG	Biological signals					Z,ZK	6
BMPROJ6	Diploma Project					Z	6

BAM31LET Medical Instrumentation and Devices

Students will study fundamental principles applied within the modern medical devices and systems, esp. from the point of view of functional blocks and electronic circuits of diagnostical and therapeutical medical equipments including electrocardiographs, electroencephalographs, bedside and central monitors, equipments for anestesiology, intensive and critical healthcare, equipments for clinical laboratory, electrostimulators, cardiostimulators and defibrilators, blood pressure and flow measurement (including dilution) and pulse oxymetry.

Statistical Data Analysis

This course builds on the skills developed in introductory statistics courses. It is practically oriented and gives an introduction to applied statistics. It mainly aims at multivariate statistical analysis and modelling, i.e., the methods that help to understand, interpret, visualize and model potentially high-dimensional data. It can be seen as a purely statistical counterpart to machine learning and data mining courses.

Medical Imaging Systems

The course covers the principles, design and properties of currently used medical imaging devices. We shall deal with 2D microscopic, X-ray and ultrasound imaging systems, including advanced topics such as Doppler ultrasound. We will also study tomographic (3D) imaging systems: computed tomography (CT), magnetic resonance imaging (MRI) including functional MRI (fMRI) and nuclear imaging methods (PET,SPECT). For more information see https://cw.fel.cvut.cz/wiki/courses/zsl

Name of the block: Compulsory courses in the specialization

Minimal number of credits of the block: 30

The role of the block: PS

Code of the group: 2018 MBIOPS4

Name of the group: Compulsory subjects of specialization

Requirement credits in the group: In this group you have to gain 30 credits

Requirement courses in the group: In this group you have to complete 5 courses

Credits in the group: 30 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BAM31ADA	Adaptive signal processing Radoslav Bortel, Pavel Sovka Radoslav Bortel (Gar.)	Z,ZK	6	2P+2C	Z	PS
BAM31MOA	Modeling and analysis of brain activity Jaroslav Hlinka Jaroslav Hlinka (Gar.)	Z,ZK	6	2P+2C	Z	PS
BAM31NPG	Neurophysiology P emysl Jiruška, Helena Pivo ková P emysl Jiruška P emysl Jiruška (Gar.)	Z,ZK	6	2P+2C	Z	PS
B2M31DSP	Advanced DSP methods Pavel Sovka, Petr Pollák Pavel Sovka Pavel Sovka (Gar.)	Z,ZK	6	2P+2C	Z,L	PS
BAM31ZAS	Analog Signal Processing Ji i Hospodka Ji i Hospodka Ji i Hospodka (Gar.)	Z,ZK	6	2P+2L	L	PS

Characteristics of the courses of this group of Study Plan: Code=2018_MBIOPS4 Name=Compulsory subjects of specialization

BAM31ADA	Adaptive signal processing	Z,ZK	6
This course provides a	basic discourse on adaptive algorithms for filtering, decorrelation, separation and beamforming.	,	1
BAM31MOA	Modeling and analysis of brain activity	Z,ZK	6
BAM31NPG	Neurophysiology	Z,ZK	6
B2M31DSP	Advanced DSP methods	Z,ZK	6

The course follows the basic course in signal processing and introduces advanced methods of analysis and digital signal processing. Graduates will learn the methods of digital signals analysis and be able to practically use them. They learn to know the conditions of use of correlation, spectral and coherent analysis of random signals. They will became familiar with methods of signal decomposition and independent component analysis and the time-frequency transformations. Emphasis will be placed on an ability to interpret the results of signal analyses

BAM31ZAS Analog Signal Processing

The course deals with analog input-output blocks for signal transmission and processing. They discussed circuit solution of amplifiers and filters, including their design process, simulation and measurement. Students learn the circuit concepts and possibilities for solving the contemporary analogue structures. The second part of the course describes the design and implementation of analog filters, including discrete-time circuits. The conclusion is devoted to the possibilities of computer optimization of electronic circuits and filters.

Name of the block: Compulsory elective courses

Minimal number of credits of the block: 24

The role of the block: PV

Code of the group: 2018_MBIOPPV4

Name of the group: Compulsory subjects of the programme

Requirement credits in the group: In this group you have to gain 24 credits

Requirement courses in the group: In this group you have to complete 4 courses

Credits in the group: 24

Note on the group:

	Tutors, authors and guarantors (gar.)	-		-		
B2M31AEDA	Experimental Data Analysis Jan Rusz Jan Rusz Jan Rusz (Gar.)	Z,ZK	6	2P+2C	Z	PV
BAM17EPM	Applications of Electromagnetic Fields in Medicine Jan Vrba, Ladislav Oppl Jan Vrba Jan Vrba (Gar.)	Z,ZK	6	2P+2L	L	PV
BAM31AOL	Applied optoelectronics in medicine Jan Havlík Jan Havlík Jan Havlík (Gar.)	Z,ZK	6	2P+2L	L	PV
BAM36BIN	Bioinformatics Ji í Kléma Ji í Kléma Ji í Kléma (Gar.)	Z,ZK	6	2P+2C	L	PV
BAM02BIO	Biosensors Bohuslav Rezek Bohuslav Rezek Bohuslav Rezek (Gar.)	Z,ZK	6	2P+2L	Z	PV
BAM02FPT	Physics for Diagnostics and Therapy Vratislav Fabián, Jan Vrba, Ladislav Oppl Vratislav Fabián Vratislav Fabián (Gar.)	Z,ZK	6	2P+2L		PV
B0M37FAV	Physiology and modeling of hearing and vision Miloš Klíma, Václav Vencovský, Petr Maršálek, Karel Fliegel Karel Fliegel Václav Vencovský (Gar.)	Z,ZK	6	2P+2C+4D	Z	PV
В4М35КО	Combinatorial Optimization Zden k Hanzálek Zden k Hanzálek Zden k Hanzálek (Gar.)	Z,ZK	6	3P+2C	L	PV
BAM38KLS	Construction of Medical Systems Jan Holub Jan Holub (Gar.)	Z,ZK	6	2P+2L	Z	PV
B4M33MPV	Computer Vision Methods Georgios Tolias, Ji í Matas, Jan ech, Dmytro Mishkin Ond ej Drbohlav Ji í Matas (Gar.)	Z,ZK	6	2P+2C	L	PV
B4M36MBG	Molecular Biology and Genetics Martin Pospíšek Martin Pospíšek Martin Pospíšek (Gar.)	Z,ZK	6	3P+1C	L	PV
BAM33NIN	Neuroinformatics Giulia D'Angelo, Ji í Hammer, Daniel Novák, Eduard Bakštein, Karla Št pánová, Ján Antolík, David Kala Daniel Novák Daniel Novák (Gar.)	Z,ZK	6	2P+2C	L	PV
B4M33PAL	Advanced algorithms Ond ej Drbohlav, Daniel Pr ša Daniel Pr ša (Gar.)	Z,ZK	6	2P+2C	Z	PV
BE4M33SSU	Statistical Machine Learning Jan Drchal, Vojt ch Franc Vojt ch Franc Vojt ch Franc (Gar.)	Z,ZK	6	2P+2C	Z	PV
B4M36SMU	Symbolic Machine Learning Filip Železný, Ond ej Kuželka, Gustav Šír Ond ej Kuželka Ond ej Kuželka (Gar.)	Z,ZK	6	2P+2C	L	PV
BAM17EMC	Introduction to electromagnetic compatibility Tomáš Ko ínek Tomáš Ko ínek (Gar.)	Z,ZK	6	2P+2L	Z	PV
BAM33ZMO	Medical Image Processing Jan Kybic, Oleksandr Shekhovtsov Jan Kybic Jan Kybic (Gar.)	Z,ZK	6	2P+2C	Z	PV
Characteristics of the	e courses of this group of Study Plan: Code=2018_MBIOPPV4 N	lame=Comp	ulsory s	ubjects of	the prog	ramme
B2M31AEDA Ex In the course of subject "Ex interpretation of data. In the	kperimental Data Analysis perimental Data Analysis perimental Data Analysis", students will acquire knowledge regarding fundamental met course of practical lectures, students will solve individual tasks using real data from sign promplex task and present obtained results. The aim of the subject is to introduce practical	hods for data ana	alysis and r	Z nachine learn nce research.	,ZK ing for evalua In the course	6 ation and of semestra
	ring and to acquire additional knowledge in solution of practical tasks.			7	,ZK	6
The major aim of these lecture in medicine. Safety limits, cl	rres is to give to students a basic overview of biophysical aspects of EM fields in different inical usage of EM field effects on biological systems, microwave hyperthermia, measu	• •		g an overview	of microwave	applications
of mobile phone users, man	metic resonance imaging, interaction of ontical radiation with highgrical tissue					

Completion Credits | Scope | Semester

Role

Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their

members)

Code

of mobile phone users, magnetic resonance imaging, interaction of optical radiation with biological tissue.

BAM31AOL	Applied optoelectronics in medicine	Z,ZK	6
BAM36BIN	Bioinformatics	Z,ZK	6
BAM02BIO	Biosensors	Z,ZK	6
BAM02FPT	Physics for Diagnostics and Therapy	Z,ZK	6

In this course, students will be introduced to the problems of locomotive organs diseases and musculoskeletal pain in the first seven lectures. Great space is devoted to electrotherapeutic methods, therapeutic ultrasound and phototherapy. Furthermore, advanced neurorehabilitation methods, especially transcranial brain stimulation methods (repetitive transcranial magnetic stimulation of the brain - rTMS, transcranial electrical stimulation of the brain - tDCS and electroconvulsive therapy - ECT) are discussed. In the second half of the semester, attention is paid to the possibilities of using ionizing electromagnetic fields in medical diagnostics and therapy (eg X-ray, proton therapy, radiotherapy, etc.).

B0M37FAV Physiology and modeling of hearing and vision Z,ZK

The primary aim of the course is to study the physiology of sensors and processes of perception of audio and visual information by human subjects as two central and most important communication channels, i.e., Human Auditory System (HAS) and Human Visual System (HVS). The course summarizes current knowledge in the field of human vision and hearing physiology and, at the same time, presents their description using mathematical models using the latest computational tools and procedures, including Machine Learning (ML), Deep Learning (DL) and Artificial Intelligence (AI). Emphasis is also placed on current and prospective applications of the mentioned knowledge. The main application area is the audiovisual technology related to human perception, but the direct employment of the acquired knowledge also includes the areas of multimedia technology, control systems, automation, robotics, safety and security technology, bioinspired systems, etc. At the same time, students gain a general overview of information processing in biological systems. A separate part is the objectification of audiovisual information perceived quality, i.e., Quality of Experience (QoE). The course is intended for students of master's degree in technical fields. The exercises will be devoted to fundamental experiments to determine the most important characteristics of HAS and HVS, including computational models and simulation of vision and hearing processes.

B4M35KO	Combinatorial Optimization	Z,ZK	6
The goal is to show th	e problems and algorithms of combinatorial optimization (often called discrete optimization; there is a strong overlap with the tei	rm operations rese	arch). Following
	algebra, graph theory, and basics of optimization, we show optimization techniques based on graphs, integer linear programm	•	
algorithms and state	space search methods. We focus on application of optimization in stores, ground transportation, flight transportation, logistics,	planning of human	resources,
scheduling in product	ion lines, message routing, scheduling in parallel computers.		
BAM38KLS	Construction of Medical Systems	Z,ZK	6
B4M33MPV	Computer Vision Methods	Z,ZK	6
The course covers se	lected computer vision problems: search for correspondences between images via interest point detection, description and ma	atching, image stitc	hing, detection,
recognition and segm	entation of objects in images and videos, image retrieval from large databases and tracking of objects in video sequences. Thi	s course is also pa	rt of the
, , ,	Imme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the fie le at https://prg.ai/minor.	eld of artificial intelli	igence. More
B4M36MBG	Molecular Biology and Genetics	Z,ZK	6
BAM33NIN	Neuroinformatics	Z,ZK	6
The Neuroinformatics	Course concentrates on modelling of neurons, stochastic learning on cellular level, information coding and decoding in brain an	d single unit proces	ssing. Examples
from clinical practices	are provided throughout the course. The labs focus on signal neuron analysis from human and animal brain.		
B4M33PAL	Advanced algorithms	Z,ZK	6
Basic graph algorithm	is and graph representation. Combinatorial algorithms. Application of formal languages theory in computer science - pattern m	atching.	
BE4M33SSU	Statistical Machine Learning	Z,ZK	6
The aim of statistical	machine learning is to develop systems (models and algorithms) for learning to solve tasks given a set of examples and some	prior knowledge al	oout the task.
This includes typical	asks in speech and image recognition. The course has the following two main objectives 1. to present fundamental learning co	ncepts such as ris	k minimisation,
maximum likelihood e	stimation and Bayesian learning including their theoretical aspects, 2. to consider important state-of-the-art models for classific	cation and regressi	on and to show
how they can be learn	ned by those concepts.		
B4M36SMU	Symbolic Machine Learning	Z,ZK	6
This course consists	of four parts. The first part of the course will explain methods through which an intelligent agent can learn by interacting with its	environment, also	known as
reinforcement learnin	g. This will include deep reinforcement learning. The second part focuses on Bayesian networks, specifically methods for infere	ence. The third part	will cover
fundamental topics fr	om natural language learning, starting from the basics and ending with state-of-the-art architectures such as transformer. Final	lly, the last part will	provide an
introduction to severa	I topics from the computational learning theory, including the online and batch learning settings.		
BAM17EMC	Introduction to electromagnetic compatibility	Z,ZK	6
The subject dwells or	problems of electromagnetic compatibility. Students obtain the basic knowledges in the field of electromagnetic compatibility -	electromagnetic ir	nterference,
suscentibility and test	ing methods. The subject leads to gain professional skills in the field of electrical engineering		

susceptibility and testing methods. The subject leads to gain professional skills in the field of electrical engineering. Z,ZK

Medical Image Processing

This course covers the most used advanced image analysis methods, with emphasis on images from medical and biological modalities, from microscopy, to ultrasound, MRI, or CT, including time sequences.

Name of the block: Elective courses Minimal number of credits of the block: 0

The role of the block: V

Code of the group: 2018_MBIOH

Name of the group: Humanities subjects

Requirement credits in the group: Requirement courses in the group:

Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
B0M16FIL	Peter Zamarovský Peter Zamarovský Peter Zamarovský (Gar.)	Z,ZK	5	2P+2S	Z,L	V
B0M16HVT	History of science and technology 2 Marcela Efmertová Marcela Efmertová Marcela Efmertová (Gar.)	Z,ZK	5	2P+2S	Z,L	V
B0M16HSD1	History of economy and social studies Marcela Efmertová	Z,ZK	5	2P+2S	Z,L	V
B0M16PSM	Psychology Jan Fiala Jan Fiala Jan Fiala (Gar.)	Z,ZK	5	2P+2S	Z,L	V
B0M16TEO	Theology Vladimír Sláme ka Vladimír Sláme ka Vladimír Sláme ka (Gar.)	Z,ZK	5	2P+2S	Z,L	V

Characteristics of the courses of this group of Study Plan: Code=2018_MBIOH Name=Humanities subjects

B0M16FIL		Z,ZK	5					
B0M16HVT	History of science and technology 2	Z,ZK	5					
This subject traces histo	his subject traces historical developments in electrical engineering branches in the world and in the Czech Lands. Its ultimate goal is to stimulate students' interest in the history are							
traditions of the subject	while highlighting the developments in technical education and professional organizations, the process of shaping scientific	life and the influe	nce of technical					
engineers								
B0M16HSD1	History of economy and social studies	Z,ZK	5					
This subject deals with	the history of the Czech society in the 19th - 21th centuries. It follows the forming of the Czech political representation, its air	ns and achieved r	esults as well as					
the social and cultural d	evelopment and coexistence of the various ethnical groups in the Czech countries.							
B0M16PSM	Psychology	Z,ZK	5					

B0M16TEO Theology Z,ZK 5

This subject provides to students the basic orientation in christian theology and requires no special previous education. After short philosophic lecture the basic theologic disciplines are gone through. The subject is determined not only to believer students who want to know the reliable theologic grounding but also above all to ones who want to get know Christianity - religion from which graws our civilization up.

Code of the group: 2018_MBIOVOL Name of the group: Elective subjects Requirement credits in the group: Requirement courses in the group:

Credits in the group: 0

Note on the group:

B4M36MBG

~Nabídku volitelných předmětů uspořádaných podle kateder najdete na webových stránkách

http://www.fel.cvut.cz/cz/education/volitelne-predmety.html\\

List of courses of this pass:

Code	Name of the course	Completion	Credits
B0M16FIL		Z,ZK	5
B0M16HSD1	History of economy and social studies	Z.ZK	5
	the history of the Czech society in the 19th - 21th centuries. It follows the forming of the Czech political representation, its aims at the social and cultural development and coexistence of the various ethnical groups in the Czech countries.		s as well as
B0M16HVT	History of science and technology 2	Z,ZK	5
•	torical developments in electrical engineering branches in the world and in the Czech Lands. Its ultimate goal is to stimulate stude ct, while highlighting the developments in technical education and professional organizations, the process of shaping scientific life engineers		
B0M16PSM	Psychology	Z,ZK	5
B0M16TEO	Theology	Z,ZK	5
are gone through. The	to students the basic orientation in christian theology and requires no special previous education. After short philosophic lecture the subject is determined not only to believer students who want to know the reliable theologic grounding but also above all to ones who religion from which graws our civilization up.	want to get know	Christianity
B0M37FAV	Physiology and modeling of hearing and vision course is to study the physiology of sensors and processes of perception of audio and visual information by human subjects as to	Z,ZK	6
physiology and, at the Learning (DL) and Artif technology related to h safety and security te objectification of audio	sels, i.e., Human Auditory System (HAS) and Human Visual System (HVS). The course summarizes current knowledge in the field same time, presents their description using mathematical models using the latest computational tools and procedures, including ficial Intelligence (AI). Emphasis is also placed on current and prospective applications of the mentioned knowledge. The main appletuman perception, but the direct employment of the acquired knowledge also includes the areas of multimedia technology, control sechnology, bioinspired systems, etc. At the same time, students gain a general overview of information processing in biological systoxisual information perceived quality, i.e., Quality of Experience (QoE). The course is intended for students of master's degree in tendamental experiments to determine the most important characteristics of HAS and HVS, including computational models and simprocesses.	Machine Learning ication area is the systems, automation areas. A separate echnical fields. The	(ML), Deep audiovisua on, robotics part is the e exercises
B2M31AEDA	Experimental Data Analysis	Z.ZK	6
	Experimental Data Analysis", students will acquire knowledge regarding fundamental methods for data analysis and machine	,	_
interpretation of data.	n the course of practical lectures, students will solve individual tasks using real data from signal processing in neuroscience resear live complex task and present obtained results. The aim of the subject is to introduce practical application of fundamental statistica students to use critical thinking and to acquire additional knowledge in solution of practical tasks.	ch. In the course	of semestra
B2M31DSP	Advanced DSP methods	Z,ZK	6
analysis and be able to	basic course in signal processing and introduces advanced methods of analysis and digital signal processing. Graduates will lear no practically use them. They learn to know the conditions of use of correlation, spectral and coherent analysis of random signals. To omposition and independent component analysis and the time-frequency transformations. Emphasis will be placed on an ability to analyses.	hey will became f	amiliar with
B4M33MPV	Computer Vision Methods	Z,ZK	6
recognition and seg	ected computer vision problems: search for correspondences between images via interest point detection, description and matching gmentation of objects in images and videos, image retrieval from large databases and tracking of objects in video sequences. This amme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of information is available at https://prg.ai/minor.	course is also pa	rt of the
B4M33PAL Basic gra	Advanced algorithms ph algorithms and graph representation. Combinatorial algorithms. Application of formal languages theory in computer science - p	Z,ZK attern matching.	6
B4M35KO	Combinatorial Optimization	Z.ZK	6
	e problems and algorithms of combinatorial optimization (often called discrete optimization; there is a strong overlap with the term of	,	_
the courses on linea	ar algebra, graph theory, and basics of optimization, we show optimization techniques based on graphs, integer linear programming space search methods. We focus on application of optimization in stores, ground transportation, flight transportation, logistics, place scheduling in production lines, message routing, scheduling in parallel computers.	g, heuristics, appr	oximation
	scrieduling in production lines, message routing, scrieduling in parallel computers.		

Molecular Biology and Genetics

Z,ZK

BAM3SAN Statistical Data Analysis Intercourse builds on the sailts developed in introductory statistics courses. Its protection yournels and gives an introduction to applied statistics. In many wars at multimorality statistics courses. Its protection yournels and gives an introduction to applied statistics. In many wars at multimorality in the course builds on the sailts developed in introduction yatistics courses. Its protection yournels and gives and modelling, i.e., the methods that help to understand, interpret, visualize and model potentially high-dimensional data. It can be seen as a purely statistical courterpart machine learning and data mining courses. BAM3SANU Symbolic Machine Learning out and mining courses. Symbolic Machine Learning out the protection of the parts. The first part of the course will applied methods frough which an intelligent agent can learn by interacting with its anvironment, allo known as interforcement learning. The will include deep reinforcement learning that the course will provide an include the parts of the same and the same and the parts of the same and the same and the parts of the same and the same and the parts of the same and the parts of the same and the parts of the same and the same and the same and the parts of the same and the s				
This course builds on the skills developed in introductory statistic courses. It is practically arriented and gives an introduction to applied statistics. It manify aims at multivariate statistics and applied and provided in the provided of the provided	B4M36SAN	Statistical Data Analysis	Z.ZK	6
machine learning and data mining ocures. Symbolic Machine Learning This collises parts. The first part of the course will explain methods through which an intelligent agent can learn by interacting with this mining. This will include deep ininforment learning. The second part because on Beyopian methods be informance that in the part will cover informance that already the part will cover informance that already the part will cover informance that already the part will cover information to several topics from the computation, including the online and batch learning settings. EAMOZEIO BIOSENSOTS BIOSENSOTS BIOSENSOTS BIOSENSOTS BAMOZEIT Physics of the part of the computational learning theory, including the online and batch learning settings. EAMOZEIT Physics of the part of		•	•	ate statistical
This course consists of four parts. The first part of the course will explain methods through which an intelligent agent can learn by the receivance that continuents the part will cover individually continuents. The will include deep reinforcement learning. The second part busses on Bayesian networks, specifically methods for inferience. The third part will cover fundamental topics from natural language learning, starting from the basics and ending with state-of-the-art architectures such as transformer. Finally, the last part will provide an introduction to several topics from the compatibility or including the online and batch learning settings. BAM02EPT Physics for Dilagnostics and Thorapy Z,ZK 6 This course, students will be introduced to the problems of locorrolive organs diseases and musculosidated pain in the first seven features. Great space is devoted to describe the problems of locorrolive organs diseases and musculosidated pain in the first seven features. Great space is devoted to describe the problems of locorrolive organs diseases and musculosidated pain in the first seven features. Great space is devoted to describe international and problems of the brain and the problems of locorrolive organs diseases and musculosidated pain in the first seven features. Great space is devoted to describe the problems of the brain and problems of decreasing and problems of the brain and problems of the brain and problems of decreasing and problems of the brain and problems o	analysis and modellin		urely statistical co	ounterpart to
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This includes typical tasks in speech and image recognition. The course has the following two main objectives 1. to present fundamental learning concepts such as risk minimisation, maximum likelihood estimation and Bayesian learning including their theoretical aspects, 2. to consider important state-of-the-art models for classification and regression and to show

how they can be learned by those concepts.

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For updated information see http://bilakniha.cvut.cz/en/f3.html Generated: day 2025-11-19, time 12:51.